DRAFT CONCEPT DOCUMENT

FULL SPECTRUM THREAT FIRE RESPONSE ENSEMBLE

This document only describes broad concepts for a potential future firefighter personal protective ensemble and should not be considered a completed requirements document

1. Introduction

Full Spectrum Threat Firefighter Response Ensemble (FSTFIRE) is an Air Force Fire and Emergency Services incident response initiative to outfit firefighters in a response ensemble that will allow them to respond to emergency incidents at home or when deployed; the response capability will include responses to fire, rescue, hazardous materials, weapons of mass destructions (WMD), immediately dangerous to life and health (IDLH) and response in nuclear, biological and chemically (NBC) contaminated environments, during contingency and wartime operations. FSTFIRE is an initiative for Air Force fire response transformation. Firefighters will be able to respond to all emergencies in any contaminated environment, engage the problem and survive. FSTFIRE will seek to leverage existing and emerging commercial technologies. To be used in the home station and deployed location, FSTFIRE must be compliant with all applicable National Fire Protection Association (NFPA) – also referred to as National Consensus Standards**,** National Institute for Occupational Safety and Health (NIOSH) and Federal Laws. It must also comply with all DOD NBC or more stringent standards

Current firefighter ensembles cannot be used during all peacetime, contingency and wartime operations. FSTFIRE will use any available and appropriate assets including those being used by other service organizations, fire protection or Special Forces teams. Civilian fire departments, Urban Search and Rescue (USAR) teams and newly developed commercially available technologies. FSTFIRE vision will be realized by integrating all emergency response organizations and DoD services and accelerating new capabilities. FSTFIRE will capture early successes in emerging programs and technologies and accelerate their introduction into the firefighters toolbox.

FSTFIRE will enable firefighter full-spectrum response operations at home and overseas in all types of contaminated environments, FSTFIRE maximizes firefighter emergency response capability. It will provide improved response capabilities allowing the firefighter operate and survive in the harshest arenas with less physical stresses and longer operational time in the hot zone.

2. Response Needs, Threats and Analysis

Air Force Fire and Emergency Services (F&ES) has the day to day need to respond to numerous types of emergency incidents that include; fire, hazardous materials (Haz-mat), WMD, vehicle accidents, emergency medical and numerous types of rescue including; confined space, high angle and building collapse. Numerous national consensus standards and public law must be considered in determining how we are equipped to respond to various incidents. This includes when we are operating in peacetime on a day to day basis at home or at contingency and wartime locations.

Threats to firefighters when responding to any incident included physical threats from the incident (i.e. fire, building collapse, infectious disease, toxic materials, oxygen deficiencies etc.), and intentional threats to harm (devices devised by terrorist or enemy nuclear, biological, chemical and conventional (NBC) attack).

3. Shortcomings of Current Peace Time Incident Response Capabilities

Air Force F&ES has limited capability to respond to terrorist attacks using WMD. Existing response capabilities are primarily built around Haz-mat response strategies and tactics using various levels of chemical protective equipment. These systems work well for small scale incidents but are manpower and equipment intensive and complex to implement. When fire is involved, Haz-mat suits are not compatible and cannot be used. Additionally, if a rescue or other critical task needs to be accomplished in an IDLH atmosphere and the environment has been contaminated by biological or chemical agents, firefighters cannot transition from an Air Purifying Respirator to supplied breathing air if necessary. Air Force fire protection requires a method to be able to respond to multiple incidents with a single ensemble. Currently, there is no ensemble that allows us to respond to incidents involving fire and NBC, or to transition from filtered air to supplied air and back again. Our ability to perform rescue and save lives and mission essential property is constrained by limitations in both protective over/under garments and breathing apparatus.

3.1. Shortcomings of Contingency and Wartime Incident Response Capabilities

Although our existing Joint Firefighter Integrated Response Ensemble (JFIRE) does give us the capability to operate in NBC environments, engage fire and effect rescue and transition between filtered air and supplied air, it has limitations that include:

The Interspiro CW mask is based on 25 year old technology; vast improvements have been made in mask technology.

- JFIRE incorporates the Joint Service Lightweight Suit Technology (JSLIST) Ensemble. These are difficult to obtain outside of the DoD fielding process. Currently firefighters cannot obtain and they are not due to be fielded until 2012. These suits cannot be opened for training. Therefore some of our personnel cannot train.
- The Interspiro CW mask and JSLIST do not meet required national consensus standards and cannot be used by any of our firefighters for peacetime uses.
- During contingency or wartime operations civilians or host nation firefighters cannot legally use the JFIRE since it doesn't meet the required standards.
- When using the JFIRE the firefighter is using two complete protective ensembles, a proximity firefighting suit and a chemical protective suit. This causes extreme physical stresses to the firefighter; the suits were not designed to be used in this manner.
- When operating in an interior structural fire or other emergency; once the firefighter exits the building he needs to rehabilitate and this is very limited with today's JFIRE. When firefighters run out of supplied air they switch to negative pressure filtered air. At this point, it is extremely difficult to breath and the desire to remove the mask is intense, this would result in severe injury or death. Bunker pants (firefighting pants) cannot be removed until the firefighter processes through the CCA.

The JFIRE is difficult to upgrade and maintain, it was created by using internal DoD testing only. Each time an article of the ensemble changes to a new national consensus standard it must go through live agent testing prior to being allowed for use. An example of this is the new NFPA 1976 proximity boot.

4. Potential Alternatives

There are a number of technologies that may address solutions for FSTFIRE. Some of these technologies currently exist within the DoD, civilian firefighting community and national USAR. Additionally, industry has begun to develop dual use breathing apparatus and materials for garments that will protect the user in WMD environments. NIOSH has created a standard for testing existing breathing apparatus that will allow for their use in chemical, biological, radiological, nuclear, (CBRN) environments. Finally, NIOSH is currently creating a test standard for dual use breathing apparatus masks. Once this testing standard exists, commercial off the shelf breathing apparatus will be able to be used by firefighters at all locations, and during peacetime. The estimated completion date for this standard is Mar 04. Where appropriate, FSTFIRE will leverage and integrate capabilities inherent in the following programs:

- Special Forces units currently using lightweight Saratoga garment for use in NBC environments, item does have a MILSPEC.
- Red Horse firefighters are looking at using these technologies.
- USAR teams are exploring any potential capabilities.
- GORE materials have materials advertised to protect against NBC and provide thermal protection meeting the requirements of NFPA 1971.
- Interspiro has a breathing apparatus mask that has met the CBRNE standard, other manufacturers are working to get this certification also.
- Interspiro plans on having an integrated mask and hood by Mar 03 that will meet the CBRNE certification and be NFPA 1976 requirements
- Mine Safety Association and Scott Aviation have developed prototype dual use SCBA's.

5. System Level CONOPS (Concept of Employment)

5.1. FSTFIRE Capabilities

There are three primary capabilities needed to achieve FSTFIRE desired effects for all fire protection full spectrum threat environments.

- *Firefighter Survivability* – Protect firefighters from NBC attack across the full spectrum where we operate. This includes peacetime, contingency and wartime operations at any location worldwide.
    - Provide firefighters a lightweight undergarment that will provide protection from known NBC weapons that may be targeted at our firefighters during military contingency and wartime operations. Also in situations where terrorists have attacked the homeland with WMD.
    - Provide firefighters with a dual use SCBA that will allow them to survive in NBC, WMD atmospheres by breathing filtered air that will protect them from inhalation hazards. Including NBC, WMD, toxic industrial chemicals and materials, (TIC-TIM) and atmospheres that are immediately dangerous to life and health (IDLH).
- *Operational Firefighting and Emergency Response Ensemble* – Protect firefighters while operating in numerous emergency response operations.
    - Structural and aircraft fires, structural rescue, aircraft egress, hazardous materials incidents, confined space, high angle, building collapse, barrier operations, etc.

- *Endurance extender* -- Firefighters will have a light weight NBC protective undergarment and modern dual use SCBA that will incorporate a powered air purifying respirator (PAPR).
  - At deployed locations when mission oriented protective posture (MOPP) levels are increased, firefighters will don the NBC protective undergarment under their BDU uniform. At increased MOPP levels where attack is imminent firefighters then don their SCBA mask with PAPR.
  - This will provide complete absorption and inhalation protection. The undergarment significantly reduces core body temperature when compared to the current JFIRE requirements. The PAPR reduces firefighter fatigue while operating in the filtered air mode.
  - Provide greater mission sustainment firefighting and rescue capabilities due to the lighter weight, reduced core body temperature and fatigue and greater agility of the firefighter.
  - Rehabilitation is greatly improved. After firefighters complete their emergency response such as an interior structural fire operation in a NBC contaminated environment they are totally exhausted. Once out of the structure firefighters will be able to remove their bunker gear and SCBA while going to PAPR mode.
  - The FSTFIRE undergarment will be durable and washable multiple times before losing its protective qualities.

5.2. FSTFIRE Effects

- Realize FSTR emergency response operational transformation.
- Improve operational effectiveness, and survivability for firefighters teams during peacetime, contingencies and wartime; worldwide.
- Enable full-spectrum threat emergency response capabilities.
- Improve adaptation and modification of the ensemble when required.
- Provide for commercial off the shelf purchasing of ensemble components that meet national consensus standards and not require additional DoD NBC testing.
- Reduce negative physical stresses and impacts to firefighters.
- Multiply mission response capabilities to the fire organization.
- Mitigate logistical, physical, budgetary, and testing constraints associated with JFIRE.

5.3. FSTFIRE Enablers

FSTFIRE will identify and leverage the best programs and technologies for integration. The goals of FSTFIRE and its enablers are complementary with each supporting and leveraging the other. Collaborative execution is envisioned where each program will cooperate fully during the planning and development stages to ensure interoperability.

- Will meet all required national consensus and DoD standards.
  - NFPA , NIOSH and Federal Law
  - DoD NBC or more stringent standards.
- Manufacturers will be notified through the government award processes

- Other DoD entities using NBC ensembles.
- Local and national civilian emergency response teams using protective ensemble technologies.
- Air Force Readiness Exercises (e.g., PACAF IRE/CIRE's).
- Silver flag training sites.
- 311th Human Systems Wing Systems Program Office.

6. Schedule and Affordability

This IRD addresses the delivery of FSTFIRE capability beginning in FY05.

6.1. Schedule

Affordability is a critical characteristic of FSTFIRE that will be addressed from program inception through completion. FSTFIRE will improve the efficiency and effectiveness of resources in terms of manpower and materiel with reduced risk and damage to personnel and equipment.

FSTFIRE will maximize the use of existing programs to minimize life cycle costs. Further, the program will aggressively connect systems to start the spiral development process. The expected return on investment will be achieved through reduced OPSTEMPO, PERSTEMPO, equipment life-cycle costs, and through the potential elimination of redundant and non-interconnected stovepiped point solutions. FSTFIRE is designed to improve readiness and integration of forces, providing combat seasoning to forces before combat and thereby reducing combat losses and speeding victory.

7. Other Factors

7.1. Interoperability

Interoperability is a capability addressed by this program and is covered throughout this document. FSTFIRE requires the interoperability of a variety of live, virtual, and constructive applications to realistically and accurately portray the operational battlespace.

7.2 Joint Potential Designator (JPD)

FSTFIRE is anticipated to have Joint interest.

8. Summary

FSTFIRE will allow firefighters to respond to emergency incidents at home or when deployed; the response capability will include responses to fire, rescue, hazardous materials, weapons of mass destructions (WMD), immediately dangerous to life and health (IDLH) and response in nuclear, biological and chemically (NBC) contaminated environments, during contingency and wartime operations. Firefighters will be able to respond to all emergencies in any contaminated environment, engage the problem and survive. FSTFIRE will enable firefighter full-spectrum response operations at home and overseas in all types of contaminated environments, FSTFIRE maximizes firefighter emergency response capability. It will provide improved response capabilities

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